

**PRELIMINARY UTILITY
IMPACT REPORT**

FOR

HAYMEADOW

November 2012
(Revised August 15, 2013)

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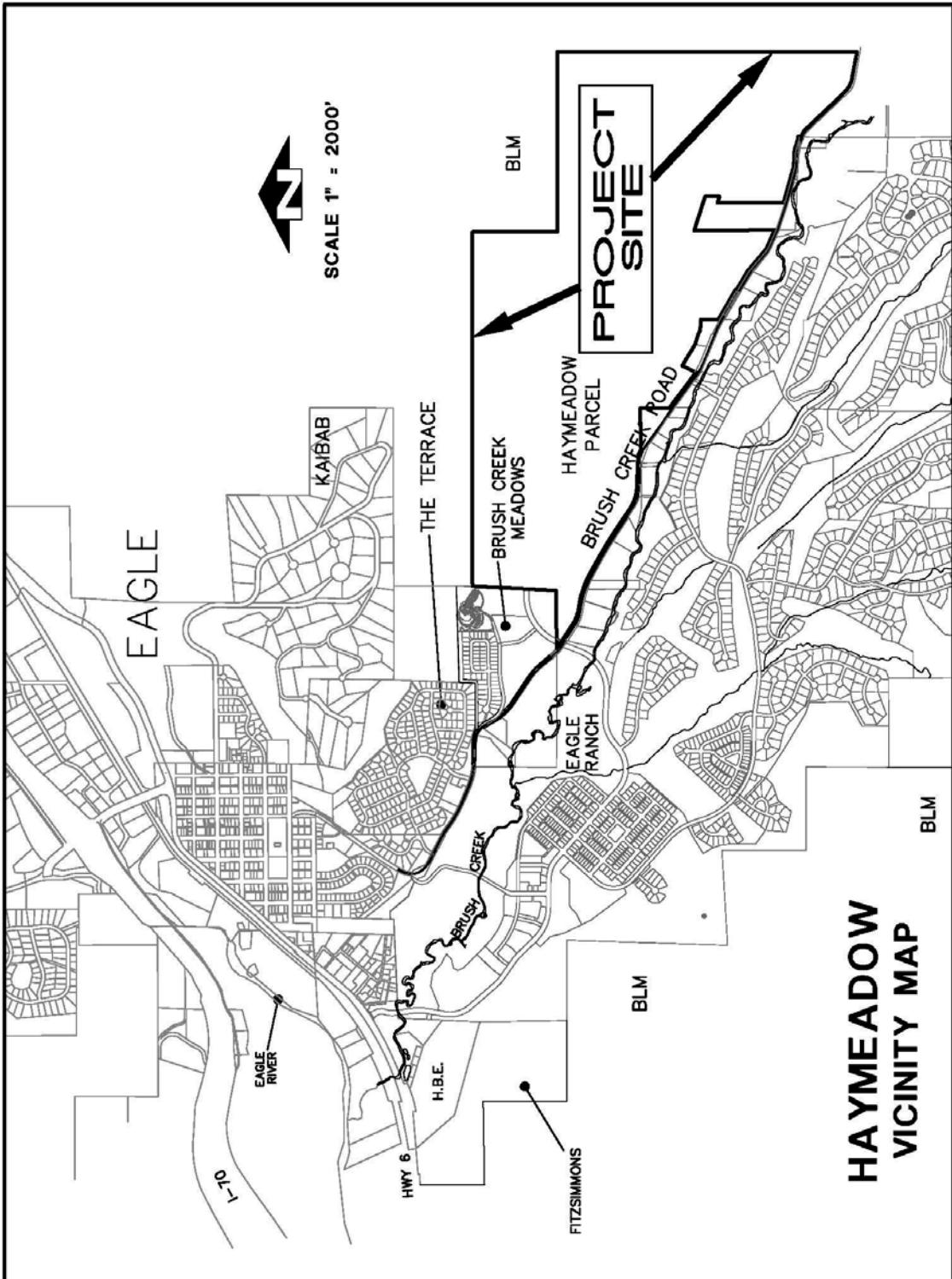
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I. Introduction.

The Haymeadow project is proposed to be on a 660-acre parcel of land near the mouth of the Brush Creek valley. The parcel borders the Town of Eagle Ice Rink and Pool complex along its western end and extends southeast along Brush Creek Road. Brush Creek Road generally forms the southern boundary of the property. BLM lands form the northern boundary and the east end of the site adjoins the Adams Rib Ranch.

The Haymeadow property is proposed to be annexed into the Town of Eagle which would in turn provide water service and sanitary collection service to the project. A non-potable irrigation system is proposed for portions of the park, open space corridors and the common areas surrounding multi-family development projects.

The conceptual plan for the Haymeadow property includes a proposed density of 787 units on the 660-acre parcel for an average overall density of approximately 1.2 units per acre. The Project is proposed to have residential neighborhood pods consisting of a mix of small single family homesites, duplex units and multifamily townhomes and flats. The Haymeadow Project is anticipated to also have a variety of auxiliary uses such as a Kindergarten through 8th grade school (K-8), special events pavilion, community park and a fire station.

II. Sanitary Sewer

Haymeadow sanitary sewer will connect to the Town of Eagle's existing trunkline located at the western end of the proposed project. The existing trunkline currently terminates near the future Sylvan Lake Road intersection with Brush Creek Road and is an 18" diameter PVC pipe. It is anticipated that this sewer trunkline will be extended to the property line between Brush Creek Meadows subdivision and Haymeadow when the Sylvan Lake Road extension is constructed. The sewage from Haymeadow will flow through the existing trunkline within the Eagle Ranch Subdivision and will then be treated at the Town's sewer treatment plant located at the confluence of Brush Creek and the Eagle River.

Projected sewer effluent volumes for Haymeadow are shown in Table 1 below and illustrate that a proposed pipe diameter of 10" will be sufficient to accommodate the peak sewer volumes at buildout of the project.

The Haymeadow project is anticipated to have approximately 2700 feet of 10" PVC sewer trunkline at the bottom end of the system with the balance of the project being served by 8" sewer mains primarily located within roadways or as backlot runs. The Haymeadow sewer system will be designed to gravity flow, no main line lift stations will be required to serve this project. Easements will be dedicated to the Town for all mains outside of road right-of-ways.

TABLE 1: HAYMEADOW – SEWAGE VOLUME
Peak Day Volume at Buildout

Unit/Density Type	Unit Count	Persons Per Unit	Sewage Volume Per Capita Daily (Gallons)	Occupancy Rate (%)	Average Daily Volume (Gallons)	Peaking Factor	Peak Day Volume (Gallons)
Single Family	442	3.2	81	100	114,566	1.5	171,849
Multi Family	345	2.8	81	100	78,246	1.5	117,369
ADU*	66	2.0	81	100	10,692	1.5	16,038
Sales Center / Community Park	1	10	15	100	150	1.5	225
Events Pavilion	1	200	5	100	1,000	1.5	1,500
K-8 School	1	600	15	100	9,000	1.5	13,500
Fire Station**	1			100	2,025	1.5	3,038
Fire Station ADU	5	2.8	81	100	1,134	1.5	1,701
TOTALS	862				216,813		325,220
T.O.E. Rec. Facility ***	n/a				5000	1.5	7500
TOTALS	862				221,813		332,720

* Accessory Dwelling Units: Assume 15% of single family lots with 850 SF max size.

** 225 gpd/1000 SF; Fire Station is assumed to be 9000 SF

*** Assumes Average Daily Volume of 5000 gallons

TABLE 2: HAYMEADOW – PIPE CAPACITY

Pipe Size (inch)	Pipe Material	Pipe Diameter (ft)	Manning's (n)	Slope 0.50%	Area A (ft ²)	Wet Area ½ full (ft ²)	Wet Perim. ½ full (ft ²)	Hydraulic Radius (ft)	Velocity V (ft/sec)	Flow Q (ft ³ /sec)	Flow Q (gal/sec)	Flow Q (gal/day)
8	PVC	0.667	0.013	0.005	0.349	0.175	1.047	0.167	2.45	0.43	3.19	275,967.21
10	PVC	0.833	0.013	0.005	0.545	0.273	1.309	0.208	2.84	0.77	5.79	500,399.07
12	PVC	1.000	0.013	0.005	0.785	0.393	1.571	0.250	3.21	1.26	9.42	813,753.51
15	PVC	1.250	0.013	0.005	1.227	0.614	1.964	0.313	3.72	2.28	17.08	1,475,543.04
18	PVC	1.500	0.013	0.005	1.767	0.884	2.356	0.375	4.20	3.71	27.77	2,399,541.50

Projected Peak Volume at Buildout = 332,720 gpd

III. Treated Water System

The proposed treated water system for the Haymeadow project will be designed to function within the Town's existing treated water system.

It is proposed to connect into the Town's existing water system at the existing transmission line just north of Brush Creek Road downstream of the Brush Creek Tank. A PRV in Sylvan Lake Road near the proposed school site would then be able to download into the Town's lower hydraulic zone during high demand events or the PRV could be set to cycle water through the system to insure water quality.

It is anticipated that the Haymeadow water system will have a 12" DIP water main running from the connection point at the Sylvan Lake Road\Brush Creek Road intersection to the proposed WST and the water lines within the development parcels will be looped 8" runs. Water services to individual lots or multi-family units will be designed in compliance with Town Design Standards. Water line easements will be created and dedicated to the Town by Final Plat for all water mains outside of the public right-of-way.

The initial schematic design for the Haymeadow water system will set the WST base elevation of 6980 with a mid tank elevation of approximately 6992. This sets the hydraulic pressures at 50 psi minimum and 137 psi maximum. These proposed pressures will allow adequate fire flow protection and residential pressures to all of the development parcels shown in the Preliminary Plan

The Haymeadow Preliminary Plan shows approximately 300 acres of development which will be served by the potable water system for in-house uses and irrigation of the single family lots.

See Tables 3 and 4 below for project water demand calculations and Table 5 for tank sizing.

TABLE 3: HAYMEADOW – DOMESTIC IN-HOUSE WATER DEMAND
Water Demand Calculations – Maximum Day Demand (Mdd) At Buildout

Unit/Density Type	Unit Count	Persons Per Unit	Water Volume Per Capita Daily (Gallons)	Average Daily Volume (Gallons)	Peaking Factor	Peak Day Volume (Gallons)
Single Family	442	3.2	100	141,440	2.0	282,880
Multi Family	345	2.8	100	96,600	2.0	193,200
ADU*	66	2.0	100	13,200	2.0	26,400
Sales Center / Community Park	1	10	20	200	2.0	400
Events Pavilion	1	200	6	1,200	2.0	2,400
K-8 School	1	600	20	12,000	2.0	24,000
Fire Station**	1			2,250	2.0	4,500
Fire Station ADU	5	2.8	100	1,400	2.0	2,800
Recreation Facility	n/a	n/a	n/a	5,550	2.0	11,100
Potable Water Irrigation	n/a	n/a	n/a	237,464	2.0	474,928
TOTALS	862			511,304		1,022,608

* Accessory Dwelling Units: Assume 15% of single family lots

** 250 gpd/1000 SF; Fire Station is 9000 SF

TABLE 4: HAYMEADOW – RESIDENTIAL IRRIGATION DEMAND
Peak Day Irrigation Demand at buildout (Potable Demand – Single Family Lots)

Irrigated Acreage	Application Rate (AF)	Avg Day Demand (acre feet)	Peaking Factor	Peak Day (AF)	Peak Day Gallons
43.3*	0.01683	0.6804	2.0	1.4575	474,928

*See Appendix A, Irrigated Area Study

TABLE 5: TANK SIZING

Demand	Peak Day Demand (gallons)
In-House	547,680
Irrigation	474,928
Total PDD	1,022,608 (1.023 MG)

Water Storage Volumes

Equalization (30% of PDD)	306,782
Emergency (50% of PDD)	511,304
Fire Flow (2250 gpm @ 2 hours)*	270,000
Total Tank Volume	1,088,086 (1.088 MG)

*Per Uniform Fire Code flow rates for Type VB home up to 7500 sf

Tank Size (Engineered Storage Products Co. – Tank Capacity Chart)

Model Diameter = 87 feet

Model Height = 24 feet

Capacity = 1.053 MG (above ground bolted steel with steel floor)

IV. Non Potable Irrigation System

The Haymeadow Project intends to have a seasonal, raw water irrigation system with its primary function being to provide irrigation flows to the parks, select open space parcels and multi-family complex common areas. It is anticipated that the single family lots will be irrigated from the treated water system. The non potable system would minimize treated water demand within the Haymeadow project which in turn would lengthen the timeframe before the proposed Lower Basin Water Treatment Facility would be needed to serve the proposed development.

The proposed non potable system would be fed by irrigation ditch water that will be routed along the northern edge of the development pods and having release points corresponding to each open space corridor separating the pods. Water would then flow through the corridors in “creek” channels and ponds as proposed landscape enhancements. The flows would then be captured into larger ponds at the bottom of the development equipped with pumps stations. The water would then be fed through a proposed irrigation system to serve the areas listed above with non-potable irrigation water. Excess water from the storage ponds would discharge to channels that would feed the historical locations of flood irrigation return flow and would continue to provide a source of water for the existing trees and wetlands within the project boundary and also continue to provide tailwater flows at their current discharge locations to neighboring, downstream properties adjacent to the Haymeadow project.

The proposed system would irrigate different areas at different application rates depending on uses and landscape aesthetics desired for various open space parcels throughout the project. The various areas to be irrigated, their relative application rates and estimated total non potable demand volumes are listed in Appendix A. Open Space areas with essentially native vegetation would require less irrigation than turf fields in the Trailhead Park area or the multi-family common areas as illustrated on the attached non potable demand worksheet.

The Haymeadow land is currently flood irrigated hay fields and the intent is to maintain those portions of the project which are not being developed in their current use as hay fields. The project will develop from west to east so that the hay fields can remain on the undeveloped portions of the project site and in the final configuration, the eastern edge and the southeastern portions of the project will remain irrigated hay fields intended to preserve the ranch heritage and to provide a visual buffer between Brush Creek Road and the proposed residential development within the site.

The system will be sized based on proposed acreage to be irrigated in each area. It is envisioned that at least 2 irrigation source ponds will be required to serve the project. The system will be similar in size and design to a golf course irrigation system and is expected to be operated and maintained by the Haymeadow Metropolitan District.

V. Shallow Utilities

Shallow utility service to the Haymeadow project is available at the western end of the project near the intersection of Sylvan Lake Road and Meadowlark Road. Holy Cross Energy, Source Gas Inc. and Century Tel have all been contacted and have indicated that their existing infrastructure is adequate to serve the proposed Haymeadow Development.

Electric mains and services for Haymeadow will be installed as phased underground runs, primarily located within project roadways. A 3 phase electric main will be required to serve the Booster Pump Station but residential service will be predominantly single phase electric.

Gas service is anticipated to be a 6 to 8" steel main running within the Sylvan Lake Road right-of-way with smaller mains providing service to development parcels.

Communication lines, including fiber optic phone and video, will be installed underground along with the alignment of the electric system.

APPENDIX A IRRIGATED AREA STUDY

Acreage Breakdown

1. Neighborhood Pods

	Parcel Acreage	Neighborhood Parks	Multi-Family Common Areas	Total
A1	40.2	8.0	14.4	22.4
A2	41.4	8.3	13.0	21.3
B	54.0	10.8	3.5	14.3
C	45.2	9.0	7.0	16.0
D	58.6	11.7	0.0	11.7
Total	239.4 Acres	47.8 Acres	37.9 Acres	85.7 Acres

2.	Non-irrigated OS	0.0 Acres
3.	Hayfields	114.4 Acres
4.	School/Recreation Areas (50%)	15.5 Acres *
5.	Natural/Rough Corridors	61 Acres
6.	Community Parks	24 Acres

* Covered by existing raw water system

VI. Non-Potable

➤	Turf Areas (High Application Rate)	
	Multi-Family Common Areas	37.9 Acres
	Neighborhood Parks	47.8 Acres
	Community Parks	24.0 Acres
	Subtotal	109.7 Acres
➤	Rough Areas (Low Application Rate)	
	Corridors/Buffers	61.0 Acres
➤	Hay Fields (Flood or System Irrigation)	
	Fields	114.4 Acres
	Total	285.1 Acres

Potable Irrigation within Neighborhood Pods – SF Lots Only

	SF Units	Avg. Lot Size SF	Potable Irrigated Areas (50%) SF	Total (acres)
A1	67	7,000	234,500	5.4
A2	90	7,500	337,500	7.7
B	147	8,000	588,000	13.5
C	88	8,000	352,000	8.1
D	50	15,000	375,000	806
Total	442		1,887,000	43.3 Acres

APPENDIX A

IRRIGATED AREA STUDY

Assumptions and Criteria

- Assumed build-out condition
- PUD Development Plan dated 8-15-2013
- Fire Flow based on 2250 gpm for 2 hours per IFC
- Assumed school fire flow volumes supplied by 2.0 MG WST at the TOE WTF
- Approximate park acreage within development pods = 20% of total acreage (irrigation worksheet from DHM)
- Assumed road right-of-way within development pods = 20% of total acreage
- School/recreation area assumed 50% irrigated
- Community parks turf areas assumed 10% turf in “natural/rough” areas along with irrigated fields and landscaping within the Trailhead Community Park
- Irrigation consumptive use calculation based on Pochop Method for Bluegrass and Eagle growing conditions